

Appl. No. 10/667,974
Amendment dated: October 6, 2005
Reply to OA of: June 6, 2005

REMARKS

Applicants acknowledge with appreciation the courtesy of the interview extended the Applicant's representative by Examiner Hailey, the Examiner in charge of this application. During the Interview the invention of the present application, the outstanding Official Action and the prior art references of record were all discussed. Applicants informally proposed amendments to the claims during the Interview.

First, Applicants suggested amending the claims to make it more clear that the present invention is directed to a mixed conductor in the form of a single material. The Examiner acknowledged that the prior art of record did not appear to teach or disclose a mixed conductor in the form of a single material.

Additionally, Applicants suggested amending the claims to make it more clear that the mixed conductor of the present invention serves as a catalyst support for a noble metal catalyst. The Examiner again acknowledged that the prior art of record did not appear to teach or disclose this limitation. The Examiner indicated that the above identified amendments would serve to advance the prosecution.

Therefore, Applicants believe that the above presented amended claims represent the incorporation of the suggestions made during the personal interview and respectfully submit that none of the prior art references of record teach or disclose the presently claimed invention.

Applicants also acknowledge with appreciation the indication that claims 8 and 9 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Accordingly, Applicants have amended the claims to add new claim 31 and 32 which represent claims 8 and 9 rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants respectfully assert that these claims are now clearly patentable over the references of record.

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With respect to the non-conforming substitute specification submitted with the previous Amendment (filed March 11, 2005), Applicants submit herewith a substitute specification that adheres to 37 C.F.R. 1.125(b) and (c). With respect to the addition of a paragraph directed to "Cross-Reference to Related Applications" that appeared in the previous substituted specification, this paragraph has been removed. Therefore, Applicants respectfully submit that the substituted specification submitted herewith does not present any new matter and fully complies with 37 C.F.R. 1.125(b) and (c). Applicants respectfully request that the substituted specification be entered.

Applicants have amended the claims to more clearly define the scope of the invention. First, claims 1-3, 5-7, 10-13, 18 and 20-30 have been amended to clarify that the mixed conductor is in the form of a single material and that the mixed conductor comprises electron conductor portions and proton conductor portions. Support for this amendment may be found at, e.g., page 2, lines 2-4 of the original specification as well as Figures 1-3. Additionally, new claims 31 and 32 have been added to further claim alternate embodiments of the present invention. As mentioned above, claims 33 and 34 represent claims 8 and 9 written in independent form including all of the limitations of the base claim and any intervening claims. Accordingly, claims 8 and 9 have been cancelled. Finally, Applicants note that claims 16, 21, 24, 26 and 29 have been amended to replace the term "zirconia oxide" with the term "zirconium oxide." This is because zirconia, by definition, is zirconium oxide. Applicants respectfully assert that all of the claims presented are now in full compliance with 35 U.S.C. §112, second paragraph and are clearly patentable over the references of record.

The rejection of claims 1-3, 5-11, 18 and 20-30 under 35 U.S.C. §112, first paragraph as claiming subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention has been carefully considered. Accordingly, Applicants have amended the claims so that the

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original phrase “not to dissolve” replaces the amended phrase “to be insoluble.” In light of this amendment, Applicants respectfully request that this rejection now be withdrawn.

With respect to the provisional obviousness-type double patenting rejection of claims 1-3, 5-10, 12 and 14-17 over claims 1, 2, 4-6, 8-12 and 14-17 of co-pending Application No. 10/509,752, Applicants respectfully request that this rejection be held in abeyance until one of the applications mature into a patent, at which time an appropriate terminal disclaimer for the still-pending application will be filed. However, at this time, Applicants would like to avoid the filing of a terminal disclaimer until such filing is absolutely necessary.

The rejection of claims 1-3, 5, 6, 11, 20, 24, 25, 29 and 30 under 35 U.S.C. §102(b) as being anticipated by Velasco has been carefully considered but is most respectfully traversed in light of the amendments made to the claims.

Applicants wish to direct the Examiner's attention to MPEP § 2131 which states that to anticipate a claim, the reference must teach every element of the claim.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). “The identical invention must be shown in as complete detail as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed.Cir. 1990).

The Official Action urges that Velasco teaches a cell for an electric double layer capacitor including a membrane formed from a solid protonic conducting electrolyte separating two electrodes, each of which is a composite electrode formed by a mixture of at least one electronic conductor and a solid electrolyte. The Official Action further urges that the configurations of electrodes 1 and 2 and membrane 3 are considered to

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read upon the claim limitation “fixed together by...” Applicants respectfully traverse these statements.

The presently amended claims recite a mixed conductor in the form of a single material, wherein an electron conductor portion and a proton conductor portion are fixed together by covalent bonding, intercalation or inclusion. In other words, and as stated on page 2, paragraph 5 of the specification, the mixed conductor of the present invention exhibits both ionic conduction and electron conduction within a single material. This can also be seen from an inspection of the figures. Figure 1, for example, shows a mixed conductor that supports a catalyst, wherein different regions of the single material mixed conductor perform different functions, namely an electron conductor function and a proton conductor function. The molecular structure of the single material is such that different regions of the material can perform these separate functions while still allowing both the electron conductor and proton conductor portions of the material to contact a catalyst particle in nano order.

To the contrary, Velasco clearly discloses a double layer capacitor wherein two separate materials are used for providing electron conduction and proton conduction. Specifically, and referring to Figure 1 of Velasco, reference numerals 1 and 2 represent composite electrodes formed by a mixture of at least one electronic conductor and at least one electrolyte. Reference numeral 3, which is sandwiched between electrodes 1 and 2, represents a membrane permeable to ions that is formed by a solid containing a protonic conducting solid electrolyte. Therefore, it is clear from reading the specification and from examining the figures that Velasco discloses two separate materials that serve different functions and are subsequently paired together to form a capacitor. Velasco does not disclose a single material wherein different portions of the single material perform a electron conductor function and a proton conductor function, as currently claimed in the present invention. Because Velasco fails to disclose this important and fundamental feature of the claimed invention, the reference cannot properly support a §102(b) rejection. Accordingly, Applicants respectfully request that this rejection be withdrawn.

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Further, with respect to claims 20, 29 and 30, the presently amended claims recite that the proton conductor portion and electron conductor portion are fixed together to form a catalyst support, wherein a noble metal catalyst is supported on the catalyst support. This is also clearly illustrated by Figures 1, 2 and 3 of the present invention. To the contrary, Velasco makes no mention of a catalyst support or a noble metal catalyst. Velasco is not directed to a double layer capacitor that can support a noble metal catalyst. Therefore, Velasco fails to disclose this element of the claims and cannot properly support a §102(b) rejection. Applicants respectfully request that this rejection be withdrawn.

The rejection of claims 2, 3, 11, 24 and 25 under 35 U.S.C. 103(a) as being obvious over Velasco has been carefully considered but is most respectfully traversed.

Applicants wish to direct the Examiner's attention to the basic requirements of a *prima facie* case of obviousness as set forth in the MPEP § 2143. This section states that to establish a *prima facie* case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

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The Official Action urges that claims 2, 3, 11 recite the phrase "obtained by," which is considered a product by process limitation. The Official Action further urges that where the Examiner has found a substantially similar product as in the applied prior art, the burden of proof is shifted to the applicant to establish that their product is patentably distinct. However, Applicants note that, as described in detail above, the Official Action has not shown where in Velasco a mixed conductor in the form of a single material having a electron conductor portion and a proton conductor portion is disclosed. Therefore, Applicants respectfully assert that because the Examiner has not found a substantially similar product in Velasco, the Official Action has failed to make out a *prima facie* case of obviousness with respect to the product by process claims. Accordingly, Applicants respectfully request that this rejection be withdrawn.

The rejection of claims 1, 6, 7, 18 and 20-30 under 35 U.S.C. §102(b) as being anticipated by Shen has been carefully considered but is most respectfully traversed in light of the amendments to the claims.

The Official Action urges that Shen discloses electrodes that can be made of mixed protonic-electronic conductors, which Applicants note are denoted as reference numerals 14 and 16 in Figure 2 of Shen. The Official Action further urges that Shen discloses that the mixed protonic-electronic conductive electrode has a variety of amplified particles consisting of an electronic conductive phase (reference numeral 82) and a protonic conductor phase (reference numeral 84). Applicants note that reference numerals 82 and 84 are referred to in the specification, respectively, as electronic conductive phase material and protonic conductive phase material as well as particles. The specification also indicates that there are gaps (reference numeral 80) between the particles.

It is clear from a careful reading of Shen that the mixed protonic-electronic conductive electrode disclosed therein comprises different particle materials that serve either a proton conductor function or an electron conductor function, and not a mixed conductor in the form of a single material as claimed in the present invention. Referring to col. 10, lines 1-23 of Shen, it is disclosed that the electrode illustrated in Figure 9,

which contains only electronic conductive particles, is inferior to the electrode in Figure 10, which contains two different conductive particle materials, both electronic and protonic. The electrode illustrated in Figure 10 is superior because there is more surface area for creation of hydrogen ions due to the addition of the protonic conductive particles. Comparison of Figure 9 and Figure 10 clearly illustrates that Figure 10 discloses an electrode comprising a first electrically conductive particle material and a second protonic conductive material.

Further, Figure 10 of Shen illustrates that the two types of particle materials are contained between the protonic membrane 12 and the current collector electrical lead 22, with gaps 80 located between the different particle materials. Comparing Figure 10 of Shen to Figures 1, 2 and 3 of the present application, it can clearly be seen that Shen does not disclose a mixed conductor in the form of a single material. Figure 1 of the present invention, for example, shows a single material with a single molecular structure, wherein different portions of the single material perform different functions. No gaps or distinct particles are present, as the mixed conductor comprises only a single, continuous material. This is in stark contrast to Figure 10 of Shen and clearly shows that the two inventions are different. Therefore, Shen fails to disclose every element of the present claims and cannot properly support a §102(b) rejection as laid out in MPEP §2131. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Moreover, with respect to claims 18, 20, 29 and 30, the presently amended claims recite that the proton conductor portion and electron conductor portion are fixed together to form a catalyst support, wherein a noble metal catalyst is supported on the catalyst support. This is also clearly illustrated by Figures 1, 2 and 3 of the present invention. To the contrary, Shen makes no mention of a catalyst support or a noble metal catalyst. Shen is not directed to a gas sensor that can support a noble metal catalyst. Therefore, Shen fails to disclose this element of the claims and cannot properly support a §102(b) rejection. Applicants respectfully request that this rejection be withdrawn.

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The rejection of claims 1-3, 10-17 and 19 under 35 U.S.C. §103(a) as being unpatentable over Shen in view of Miyabayashi has been carefully considered but is most respectfully traversed in view of the amendment to the claims.

All of claims 1-3, 10-17 and 19 either directly recite or depend from a claim that recites a mixed conductor in the form of a single material comprising an electron conductor portion and proton conductor portion. As discussed in detail above, Shen fails to disclose this feature of the presently amended claims. Further, Miyabayashi fails to remedy this deficiency. The Official Action has not pointed to where in Miyabayashi a mixed conductor in the form of a single material is disclosed nor does a close inspection of Miyabayashi reveal such a disclosure. Because the references, either standing alone or combination, fail to disclose or suggest every element of the claimed invention as required by MPEP §2143, Applicants respectfully request that this rejection be withdrawn.

In view of the above comments and further amendments to the claims and drawings, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,

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